

Market Trends

The projections in *AEO2003* are not statements of what will happen but of what might happen, given the assumptions and methodologies used. The projections are business-as-usual trend forecasts, given known technology, technological and demographic trends, and current laws and regulations. Thus, they provide a policy-neutral reference case that can be used to analyze policy initiatives. EIA does not propose, advocate, or speculate on future legislative and regulatory changes. All laws are assumed to remain as currently enacted; however, the impacts of emerging regulatory changes, when defined, are reflected.

Because energy markets are complex, models are simplified representations of energy production and consumption, regulations, and producer and consumer behavior. Projections are highly dependent on the data, methodologies, model structures, and assumptions used in their development.

Behavioral characteristics are indicative of real-world tendencies rather than representations of specific outcomes.

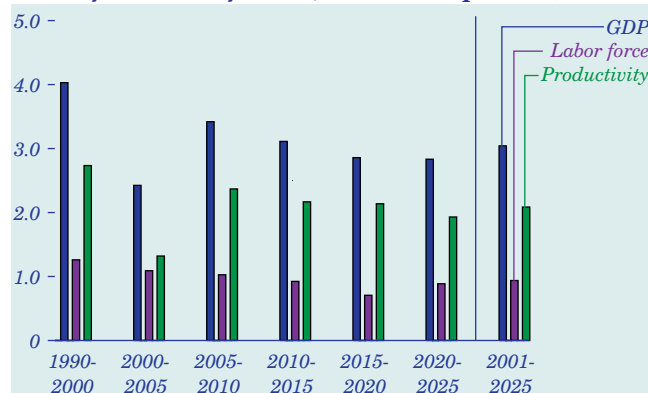
Energy market projections are subject to much uncertainty. Many of the events that shape energy markets are random and cannot be anticipated, including severe weather, political disruptions, strikes, and technological breakthroughs. In addition, future developments in technologies, demographics, and resources cannot be foreseen with any degree of certainty. Many key uncertainties in the *AEO2003* projections are addressed through alternative cases.

EIA has endeavored to make these projections as objective, reliable, and useful as possible; however, they should serve as an adjunct to, not a substitute for, analytical processes in the examination of policy initiatives.

Trends in Economic Activity

Strong Economic Growth Is Expected To Continue

Figure 28. Projected average annual real growth rates of economic factors, 2001-2025 (percent)

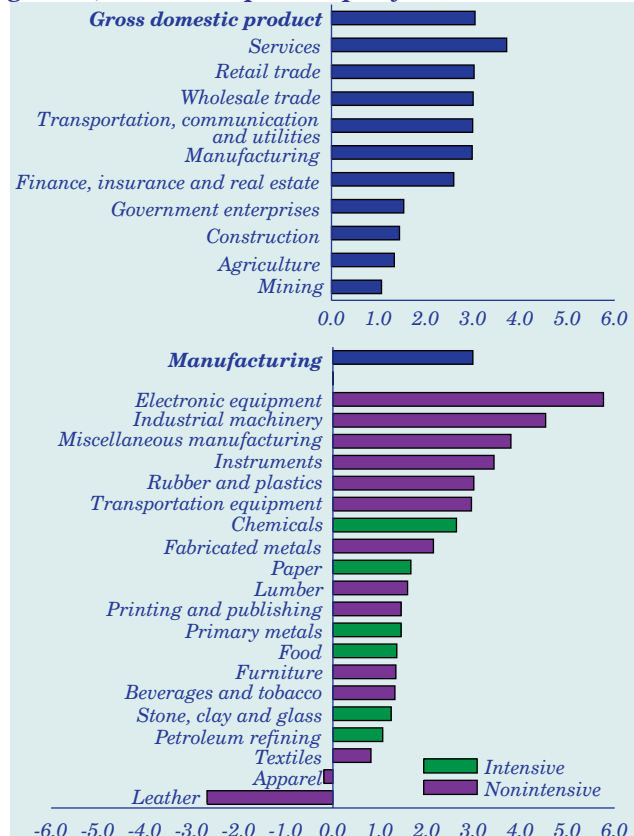


The output of the Nation's economy, measured by gross domestic product (GDP), is projected to increase by 3.0 percent per year between 2001 and 2025 (with GDP based on 1996 chain-weighted dollars) (Figure 28). The projected growth rate through 2020 is 3.1 percent, the same as projected in AEO2002. The labor force is projected to increase by 0.9 percent per year between 2001 and 2025, slightly higher than last year's forecast through 2020. Productivity (GDP over labor force) growth is 2.1 percent per year, slightly down from 2.2 percent per year in AEO2002.

Compared with the second half of the 1990s, the projected rates of growth in GDP and labor force productivity are much lower in the period 2000-2005, reflecting present economic uncertainties and revisions to historical trends. They are expected to pick up as productivity increases and the economy moves back to its long-term growth path. Total population growth (including armed forces overseas) is expected to remain fairly constant after 2001, with an annual growth rate of 0.8 percent per year. Projected labor force growth slows down because of demographic changes but remains strong as more people over 65 decide to stay in the work force. After the first 5 years of the forecast period, labor force productivity growth is expected to remain at about 2 percent per year through 2025. For the forecast period (2001 through 2025), disposable income is projected to grow by 2.9 percent per year and disposable income per capita by 2.1 percent per year. Non-agriculture employment is projected to grow by 1.0 percent per year, and employment in manufacturing is projected to grow by 0.2 percent per year.

Electronic, Industrial Equipment Lead Manufacturing Growth

Figure 29. Projected sectoral composition of GDP growth, 2001-2025 (percent per year)

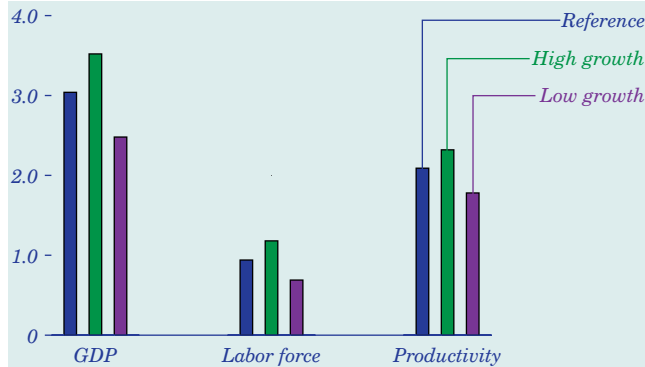


The projected growth rate for manufacturing production is 3.0 percent per year, the same as projected for the aggregate economy (Figure 29). Energy-intensive manufacturing sectors are expected to grow more slowly than the non-energy-intensive sectors (1.4 percent and 3.4 percent annual growth, respectively).

The electronic equipment and industrial machinery sectors lead the expected growth in manufacturing, as semiconductors and computers continue to find broader applications. Miscellaneous manufacturing and instruments are expected to grow faster than manufacturing as a whole, reflecting continued strong demand for high-quality consumer goods and high-tech instruments. Production of services (business and personal) is expected to grow at an average annual rate of 3.7 percent. The growth rates projected for retail trade, wholesale trade, transportation and communications are about the same as for overall manufacturing. Mining and agriculture remain the slowest-growing sectors of the economy.

High and Low Growth Cases Reflect Uncertainty of Economic Growth

Figure 30. Projected average annual real growth rates of economic factors in three cases, 2001-2025 (percent)



To reflect the uncertainty in forecasts of economic growth, *AEO2003* includes high and low economic growth cases in addition to the reference case (Figure 30). The high and low growth cases show the projected effects of alternative growth assumptions on energy markets. The alternative economic variables—including GDP and its components, interest rates, disposable income, population and employment—are set up as deviations from the reference case. The three economic growth cases are prepared by EIA and based on Global Insight's macroeconomic model.

The high economic growth case assumes higher projected growth rates for population (1.0 percent per year), labor force (1.2 percent per year), and labor productivity (2.3 percent per year). With higher productivity gains, inflation and interest rates are projected to be lower than in the reference case, and economic output is projected to grow by 3.5 percent per year. GDP per capita is expected to grow by 2.5 percent per year, compared with 2.2 percent in the reference case. The low economic growth case assumes lower growth rates for population (0.6 percent per year), labor force (0.7 percent per year), and productivity (1.8 percent per year), resulting in higher projections for prices and interest rates and lower projections for industrial output growth. In the low growth case, economic output is projected to increase by 2.5 percent per year from 2001 through 2025, and growth in GDP per capita is projected to slow to 1.9 percent per year.

Long-Run Trend Shows U.S. Economic Growth of About 3 Percent per Year

Figure 31. Average annual GDP growth rate for the preceding 24 years, 1970-2025 (percent)

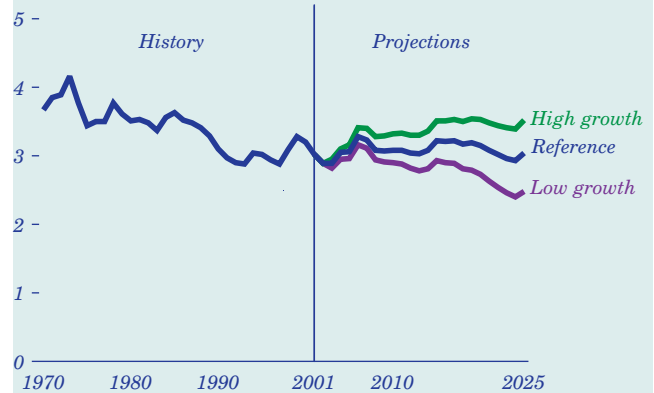


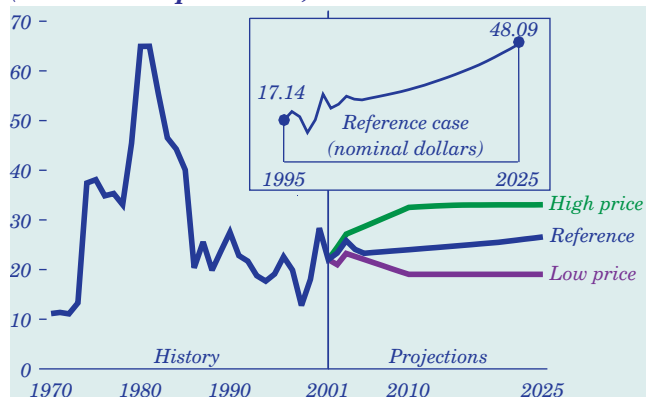
Figure 31 shows the trend in the moving 24-year average annual growth rate for GDP, including projections for the three *AEO2003* cases. The value for each year is calculated as the annual growth rate over the preceding 24 years. The 24-year average shows major long-term trends in GDP growth by smoothing more volatile year-to-year changes (although the increase shown for 1998-1999 reflects the negative growth of 1974-1975). Annual GDP growth has fluctuated considerably around the trend. The high and low growth cases capture the potential for different paths of long-term output growth.

One reason for the variability of the forecasts is the composition of economic output, reflected by growth rates of consumption and investment relative to overall GDP growth. In the reference case, consumption is projected to grow by 3.0 percent per year, while investment grows at a 4.5-percent annual rate. In the high growth case, growth in investment is projected to increase to 5.2 percent per year. Higher investment rates lead to faster capital accumulation and higher productivity gains, which, coupled with higher labor force growth, yield higher aggregate economic growth than projected in the reference case. In the low growth case, annual growth in investment expenditures is projected to slow to 3.3 percent. With the labor force also growing more slowly, aggregate economic growth is expected to slow considerably.

International Oil Markets

Projections Vary in Cases With Different Oil Price Assumptions

Figure 32. World oil prices in three cases, 1970-2025 (2001 dollars per barrel)



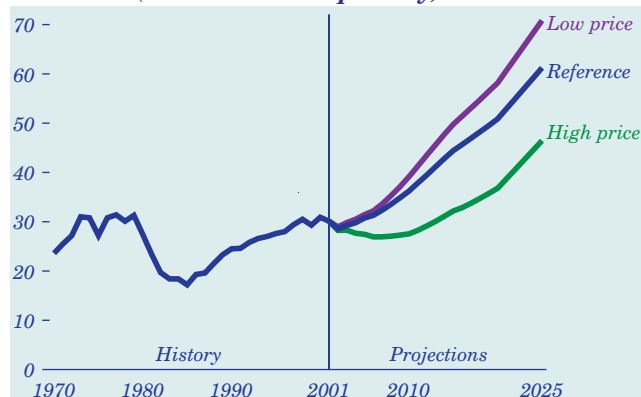
The historical record shows substantial variability in world oil prices, and there is similar uncertainty about future prices. Three *AEO2003* cases with different price paths allow an assessment of alternative views on the course of future oil prices (Figure 32). In the reference case, projected prices rise initially (through 2003), decline briefly (through 2005), then rise by about 0.7 percent per year to \$26.57 in 2025 (all prices in 2001 dollars unless otherwise noted). In nominal dollars, the reference case price is expected to exceed \$48 in 2025. In the low price case, prices are projected to decline from their high in 2003, reaching \$19.04 by 2010, and to remain at that level out to 2025. The high price case projects a price rise of about 2.9 percent per year from 2001 to 2015, with prices remaining at about \$33 out to 2025. The projected leveling off in the high price case is due to the market penetration of alternative energy supplies that could become economically viable at that price.

The price projections in the three cases are somewhat higher than those in *AEO2002*, recognizing the recent success of OPEC production cutbacks in raising oil prices and acknowledging that such OPEC market management behavior will most likely continue in the future. Production from countries outside OPEC is expected to show a steady increase, from around 47 million barrels per day in 2002 to about 62 million barrels per day by 2025.

Total world demand for oil is expected to reach 112 million barrels per day by 2020 and 123 million by 2025. Developing countries in Asia show the largest projected growth in demand, averaging 3.3 percent per year, led by China at 3.9 percent per year.

Uncertain Prospects for Persian Gulf Production Shape Oil Price Cases

Figure 33. OPEC oil production in three cases, 1970-2025 (million barrels per day)



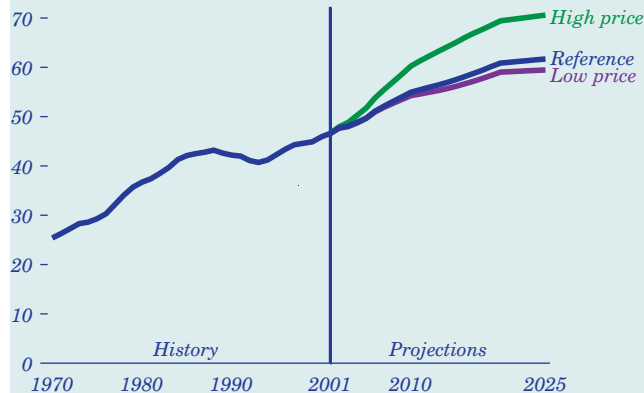
The three price cases are based on alternative assumptions about oil production levels in OPEC nations: higher in the low price case and lower in the high price case. With its vast store of readily accessible oil reserves, OPEC—primarily the Persian Gulf nations—is expected to be the principal source of marginal supply to meet increases in demand.

The projected increase in OPEC production capacity in the reference case is consistent with announced plans for OPEC capacity expansion [32]. By 2025, OPEC production is projected to be about 61 million barrels per day (more than twice its 2001 production) in the reference case, 46 million in the high price case, and roughly 71 million in the low price case (Figure 33). Worldwide demand for oil varies across the price cases in response to the price paths. The forecasts of total world demand for oil range from 131 million barrels per day in the low price case to 117 million barrels per day in the high price case.

The variation in oil production forecasts reflects uncertainty about the prospects for future production from the Persian Gulf region. The expansion of productive capacity will require major capital investments, which could depend on the availability and acceptability of foreign investments. Iraq is assumed to continue selling oil at sanction-allowed volumes through 2003 and, once the sanctions are lifted, expand its production capacity to about 6 million barrels per day. Recent discoveries offshore of Nigeria, as well as Venezuela's plans to continue the expansion of its ultra-heavy-oil production capacity, will more than accommodate increasing demand in the absence of Iraq's full return to the oil market.

Production Increases Are Expected for Non-OPEC Oil Producers

Figure 34. Non-OPEC oil production in three cases, 1970-2025 (million barrels per day)

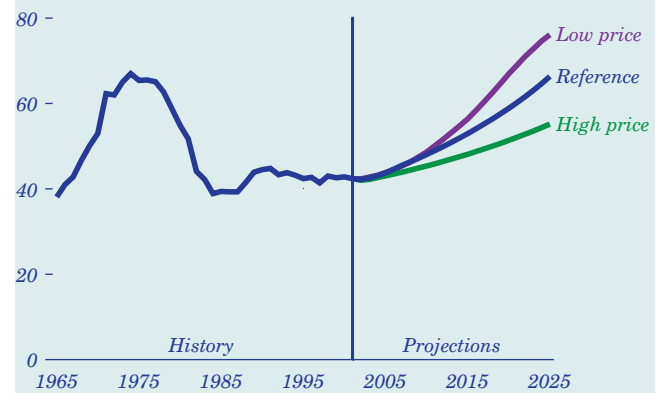


The growth and diversity in non-OPEC oil supply have shown surprising resilience even during the low price environment of the late 1990s. Although OPEC producers will certainly benefit from the projected growth in oil demand, significant competition is expected from non-OPEC suppliers. Countries in the Organization for Economic Cooperation and Development (OECD) that are expected to register production increases over the next decade include Norway, Australia, Canada, and Mexico. Canada is expected to almost double current production volumes by significantly increasing nonconventional output from oil sands in its western territory. In Latin America, Brazil, Argentina, Ecuador, Peru, and Trinidad are showing accelerated growth in oil production, due in part to privatization efforts. Deepwater projects off the coast of western Africa and in the South China Sea will start producing significant volumes of oil early in this decade. In addition, much of the increase in non-OPEC supply over the next decade is expected to come from the former Soviet Union, and political uncertainty appears to be the only potential barrier to the development of vast oil resources in the Caspian Basin.

In the *AEO2003* reference case, non-OPEC supply is projected to reach almost 62 million barrels per day by 2025 (Figure 34). In the low oil price case, non-OPEC supply is projected to grow to more than 59 million barrels per day by 2025, whereas in the high oil price case it is projected to reach more than 70 million barrels per day by the end of the forecast period.

Persian Gulf Producers Could Take More Than Half of World Oil Trade

Figure 35. Persian Gulf share of worldwide crude oil exports in three cases, 1965-2025 (percent)

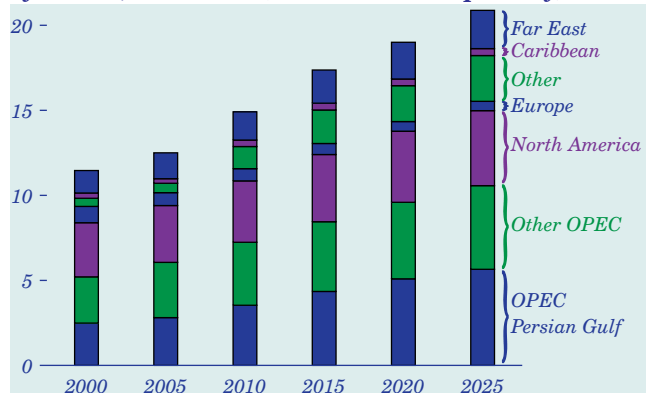


Considering the world market in crude oil exports, the historical peak for Persian Gulf exports (as a percent of world oil exports) occurred in 1974, when they made up more than two-thirds of the crude oil traded in world markets (Figure 35). The most recent historical low for Persian Gulf oil exports came in 1984 as a result of more than a decade of high oil prices, which led to significant reductions in worldwide petroleum consumption. Less than 40 percent of the crude oil traded in 1984 came from Persian Gulf suppliers. Following the 1985 oil price collapse, the Persian Gulf export percentage again began a gradual increase, but it leveled off in the 1990s at 40 to 45 percent when non-OPEC supply proved to be unexpectedly resilient.

In the *AEO2003* reference case, Persian Gulf producers are expected to account for 45 percent of worldwide trade by 2007—for the first time since the early 1980s. After 2007, the Persian Gulf share of worldwide petroleum exports is projected to increase gradually to 66 percent by 2025. In the low oil price case, the Persian Gulf share of total exports is projected to reach 76 percent by 2025. All Persian Gulf producers are expected to increase oil production capacity significantly over the forecast period, and both Saudi Arabia and Iraq (assuming the lifting of United Nations export sanctions after 2003) are expected to nearly triple their current production capacity.

OPEC Is Expected To Account for Half of U.S. Oil Imports by 2025

Figure 36. Projected U.S. gross petroleum imports by source, 2001-2025 (million barrels per day)



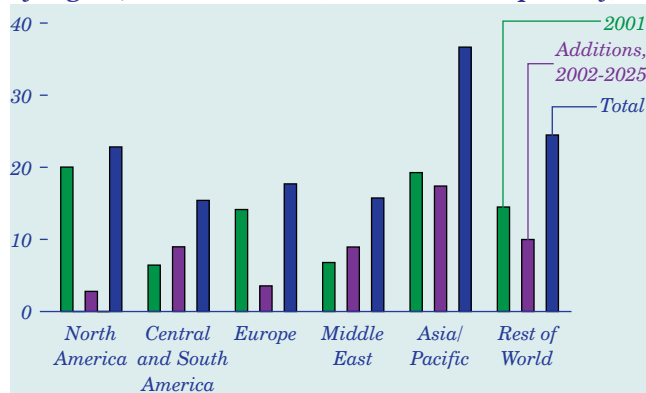
In the reference case, total U.S. gross oil imports are projected to grow from 11.9 million barrels per day in 2001 to 20.9 million in 2025 (Figure 36). Crude oil accounts for most of the expected increase in imports through 2010, but imports of petroleum products make up a larger share after 2010. Product imports are projected to grow more rapidly as U.S. production stabilizes, because U.S. refineries lack the capacity to process much larger quantities of imported crude oil.

OPEC is expected to account for less than 50 percent of total projected U.S. petroleum imports through most of the forecast. The OPEC share is expected to increase gradually to 50 percent by 2019 and exceed 50 percent for the remainder of the forecast. The Persian Gulf share of U.S. imports from OPEC is projected to range between 46 and 54 percent consistently throughout the forecast. Crude oil imports from the North Sea are projected to increase slightly through 2007, then to decline gradually as the United Kingdom's North Sea production ebbs. Significant imports of petroleum from Canada and Mexico are expected to continue, and West Coast refiners are expected to import crude oil from the Far East to replace the declining production of Alaskan crude oil.

Imports of light products are expected to more than triple by 2025, to 5.3 million barrels per day. Most of the projected increase is from refiners in the Caribbean Basin, North Africa, and the Middle East, where refining capacity is expected to expand significantly. Vigorous growth in demand for lighter petroleum products in developing countries means that U.S. refiners are likely to import smaller volumes of light, low-sulfur crude oils.

Asia/Pacific Region Is Expected To Surpass U.S. Refining Capacity

Figure 37. Projected worldwide refining capacity by region, 2001 and 2025 (million barrels per day)



Worldwide crude oil distillation capacity was 81.2 million barrels per day at the beginning of 2002. To meet the growth in international oil demand in the reference case, worldwide refining capacity is expected to increase by 64 percent—to almost 133 million barrels per day—by 2025. Substantial growth in distillation capacity is expected in the Middle East, Central and South America, and the Asia/Pacific region (Figure 37).

The Asia/Pacific region was the fastest growing refining center in the 1990s. It surpassed Western Europe as the world's second largest refining center and, in terms of distillation capacity, is expected to surpass North America before 2005. While not adding significantly to their distillation capacity, refiners in the United States and Europe have tended to improve product quality and enhance the usefulness of heavier oils through investment in downstream capacity.

Future investments in the refinery operations of developing countries must include configurations that are more advanced than those currently in operation. Their refineries will be called upon to meet increased worldwide demand for lighter products, to upgrade residual fuel, to supply transportation fuels with reduced lead, and to supply both distillate and residual fuels with decreased sulfur levels. An additional burden on new refineries will be the need to supply lighter products from crude oils whose quality is expected to deteriorate over the forecast period.